International Standard

ISO/IEC 15416

Third edition
2025-01

Automatic identification and data capture techniques — Bar code print quality test specification — Linear symbols

Techniques automatiques d'identification et de capture des données — Spécifications pour essai de qualité d'impression des codes à barres — Symboles linéaires

This document is a preview generated by EVS

Reference number
ISO/IEC 15416:2025(en)

© ISO/IEC 2025

This document is a preview generated by EVS

COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **v**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols and abbreviated terms **3**
4.1 Symbols 3
4.2 Abbreviated terms 4
5 Measurement methodology **4**
5.1 General requirements 4
5.2 Reference reflectivity measurements 5
5.2.1 General 5
5.2.2 Measurement light source 5
5.2.3 Measuring aperture 5
5.2.4 Optical geometry 6
5.2.5 Inspection band 7
5.2.6 Number of scans 8
5.3 Scan reflectance profile 8
5.4 Scan reflectance profile assessment parameters 9
5.4.1 General 9
5.4.2 Element determination 10
5.4.3 Edge determination 10
5.4.4 Decode 10
5.4.5 Symbol contrast 10
5.4.6 Edge contrast 10
5.4.7 Modulation 11
5.4.8 Defects 11
5.4.9 Decodability 13
5.4.10 Quiet zone check 14
6 Symbol grading **14**
6.1 General 14
6.2 Scan reflectance profile grading 15
6.2.1 General 15
6.2.2 Decode 15
6.2.3 Reflectance parameter grading 15
6.2.4 Decodability 16
6.3 Expression of symbol grade 16
Annex A (normative) **Decodability** **17**
Annex B (normative) **Threshold calculation algorithm — Algorithm description** **18**
Annex C (informative) **Example of symbol quality grading** **19**
Annex D (informative) **Substrate characteristics** **21**
Annex E (informative) **Interpretation of the scan reflectance profile and profile grades** **24**
Annex F (informative) **Guidance on selection of light wavelength** **27**
Annex G (informative) **Guidance on the number of scans per symbol** **28**
Annex H (informative) **Example of verification report** **29**
Annex I (informative) **Comparison with traditional methodologies** **30**
Annex J (informative) **Process control requirements** **33**

This document is a preview generated by EVS

© ISO/IEC 2025 – All rights reserved

Annex K (informative) **Description of significant changes in this edition of this document** **37**
Bibliography **38**

This document is a preview generated by EVS

© ISO/IEC 2025 – All rights reserved

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents and https://patents.iec.ch. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

This third edition cancels and replaces the second edition (ISO/IEC 15416:2016), which has been technically revised.

The main changes are as follows:

— the calculation of threshold to find edges within a scan reflectance profile has been modified;

— the calculation of R_{max} and R_{min} has been modified;

— the calculation of continuous grades has been clarified.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

This document is a preview generated by EVS

© ISO/IEC 2025 – All rights reserved

Introduction

The technology of bar coding is based on the recognition of patterns encoded in bars and spaces of defined dimensions according to rules defining the translation of characters into such patterns, known as the symbology specification.

The bar code symbol is produced in such a way as to be reliably decoded at the point of use, if it is to fulfil its basic objective as a machine-readable data carrier.

Manufacturers of bar code equipment and the producers and users of bar code symbols therefore require publicly available standard test specifications for the objective assessment of the quality of bar code symbols, to which they can refer to when developing equipment and application standards or determining the quality of the symbols. Such test specifications form the basis for the development of measuring equipment for process control and quality assurance purposes during symbol production, as well as afterwards.

This edition of this document introduces several new methods of grading bar code symbols that will improve the stability of results and modernize the grading method to be more in alignment with modern methods of bar code scanning. Further details about the changes made in this edition of this document are discussed in Annex K.

The performance of measuring equipment is covered in ISO/IEC 15426-1.

This document is intended to be read in conjunction with the symbology specification applicable to the bar code symbol being tested. The symbology-specification provides symbology specific details. Additionally, an application specification is required to apply this document.

This methodology provides symbol producers and their trading partners a universally standardized means for communicating about the quality of bar code symbols after they have been printed.

This document is a preview generated by EVS

© ISO/IEC 2025 – All rights reserved

Automatic identification and data capture techniques — Bar code print quality test specification — Linear symbols

This document is a preview generated by EVS

1 Scope

This document

— specifies the methodology for the measurement of specific attributes of bar code symbols,

— defines a method for evaluating these measurements and deriving an overall assessment of symbol quality, and

— gives information on possible causes of deviation from optimum grades to assist users in taking appropriate corrective action.

This document applies to those symbologies for which a reference decode algorithm has been defined, and which are intended to be read using linear scanning methods, but its methodology can be applied partially or wholly to other symbologies.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 19762, *Information technology — Automatic identification and data capture (AIDC) techniques — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19762 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
bar reflectance
lowest reflectance value in the scan reflectance profile of a bar element

3.2
defect
irregularity found within elements and quiet zones

3.3
edge contrast
difference between *bar reflectance* (3.1) and *space reflectance* (3.13) of two adjacent elements

3.4
element reflectance non-uniformity
reflectance difference between the highest *peak* (3.9) and the lowest *valley* (3.15) in the scan reflectance profile of an individual element or quiet zone

© ISO/IEC 2025 – All rights reserved